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## Herbert Simpson Parish (1870–1957) [1]

The well-known professional collector of tropical American insects, Mr. Herbert S. Parish, died in Toronto, Ontario, Canada, on July 26, 1957. Many entomologists of the past owe a great debt of gratitude to Parish for his efforts in making known the rich and, at that time, poorly collected insect fauna of the American tropics. In my own case, I began purchasing crane-flies from him during his first trip to Brazil in 1911–1912 and continued to secure from him very desirable materials from all of his succeeding expeditions. The following account of his life and activities is based primarily on a long series of letters from him, covering his principal expeditions since 1911, with some additional personal data supplied by him at my request in a letter dated March 8, 1934. I am particularly indebted to his daughter-in-law, Mrs. Robert Simpson Parish, of Toronto, for additional information required to complete this biographical account.

Herbert Parish was born in Toronto on July 17, 1870, the son of Robert Simpson Parish and Margaret Hornibrook Parish. The father was born in Yorkshire, England, coming to Canada in 1855, and residing in Toronto until 1895. At that time he moved to Sault Ste. Marie, Ontario, where he died in 1903 at the age of 74. The mother died in Toronto in 1917 at the age of 78, having been born in County Cork, Ireland; her family migrated to Canada in 1851. From this union five children were born, the sole survivor at the time of Parish's death being a brother, John Hornibrook Parish, presently living in Sault Ste. Marie. In 1900, Herbert Parish married Miss

[1] Contribution from the Entomological Laboratory, University of Massachusetts.

Lavina Taylor, of Toronto, who died on March 22, 1939. There was a single child, Robert Simpson Parish, presently residing in Toronto with his wife, Alice. They have two children, a daughter, Mrs. Davis W. Heffring, and a son, John Herbert, residing in Woodstock, Ontario, and having two children, the great grandchildren of the subject of this biography.

From his letters, Parish had indicated that he held an interest in insects even as a small boy. In 1896, at the age of 26, he understook his first collecting trip to the tropics, to Haiti, where he remained for nine months, specializing in the Lepidoptera but collecting in many other orders.[2] His second trip, to Cuba in 1898, was a failure due to financial difficulties. The next year he went to British Guiana, his first trip to South America. In 1902, two years after his marriage, Parish returned to Cuba, this time stressing Oriente State in the mountainous eastern part of the island. In 1908–1909 he again collected in British Guiana.

His first trip to Brazil was in 1911–1912. Parish arrived in Belém (Pará)[3] in December 1911, later moving easterly to the village of Igarape Açu (Igarape Assu) and finally to Prata, all such stations being in eastern Brazil just south of the Baía de Marajo. Students who may require additional information concerning his four major expeditions to South America (eastern Brazil, 1911–1912; British Guiana, 1912–1913; Colombia, Ecuador, and Peru, 1914; Amazonian region of Brazil and Peru, 1919–1920) will find some further account in my papers.[4]

On his 1912–1913 trip to British Guiana, Parish worked particularly at Bartica, on the Essequibo River, and at Malali

[2] While it was never so indicated by Parish, one might believe that he may have been influenced in going to Haiti by a book by Eugene Murray-Aaron, "The Butterfly Hunters in the Caribbees," that had appeared in print only two years before (pp. 269, 1 map, 8 plates; Scribners, 1894).

[3] Names in parentheses indicate alternative spellings at the time collections were made.

[4] Alexander, C. P. Proc. U. S. Nat. Mus., 44: 484; 1913 (*Brazil*, 1911–1912). Trans. Amer. Ent. Soc., 40: 223–225; 1914 (*British Guiana*, 1912–1913). Trans. Amer. Ent. Soc., 42: 1–4; 1916 (*Colombia, Ecuador*, and *Peru*, 1914). Proc. Acad. Nat. Sci. Philadelphia, 1921: 39–41; 1921 (*Amazonian Brazil* and *Peru*, 1919–1920).

(Mallali), on the Demerara. His 1914 expedition to the northern Andes of Colombia, Ecuador, and Peru was brought to an abrupt and disappointing end by the oncoming of World War I and the cutting off of his financial sources. He arrived in Buenaventura, Colombia, on May 5, 1914, moving to the mountains and collecting at Cisneros, Caldas, and La Cumbre, thence crossing the western cordillera to Cali, in the valley of the Cauca River (Magdalena system). Proceeding southward into Ecuador, he stressed particularly coastal Guayaquil and Duran, continuing into the mountains to Huigra and Alaousi (9450 feet). In Peru he collected at Callao and Lima, on the coast, and thence travelled into the higher Andes, collecting particularly at Oroya (12,178 feet), Jauja (11,878 feet), and Huancayo (10,636 feet).

Parish's longest and most important expedition was his second to Brazil in 1919–1920, when he spent approximately one year following the Amazon and some of its tributary streams. He arrived in Belém (Pará) in June 1919, at first collecting over the same ground that he had visited in 1911–1912. Continuing up the Amazon by river steamers, Parish made stops at Santarém, Óbidos (Óbydos of Henry W. Bates), and Oriximiná, the last on the Trombetas River, a tributary stream. Proceeding further up the Amazon he collected at Parintins, Ilha de Serpa (Itacoatiara), and Manaus (Manaos), visiting a nearby station, Flores, where unusually rich collecting was found. He then followed the upper Amazon, now called the Solimões, making various stops in Brazil, including Tefé (Teffé; Ega of Bates), Tonantins, Matura (Amatura), São Paulo de Olivenca, and finally Tabatinga, where Brazil, Colombia, and Peru meet. Continuing up the river, now the Marañon and in the Peruvian territory of Loreto, he visited successively Pernata, Mancallacta, Pebas, and Iquitos. He followed the river until it joins the Huallaga, advancing up the latter to Yurimaguas, his farthest point on the Amazonian system. His final trip to South America was in 1933, when he visited Paramaribo, Dutch Guiana, continuing into British Guiana. On this trip he contracted a case of blood poisoning that came very close to ending his career.

All of Parish's later years were spent in Ontario. For seventeen summers, from 1935 to 1952, the family had a cottage on Georgian Bay, Lake Huron, near Penetanguishene and Midland. Here, at Thunder Bay Beach, he collected many thousands of insects, these serving to make his brief label "T.B.B." very familiar to various entomological correspondents. Some ten years before his death, Parish became unable to do much active field collecting and he devoted more and more of his time to oil painting, in which art he became highly proficient. Many of his beautiful paintings, as well as his personal collection of insects—the latter consisting especially of showy butterflies and moths—remain in the possession of his son. It is believed that the insect collection eventually will become the property of the University of Toronto.

CHARLES P. ALEXANDER

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## The Mystery of Entomobrya duolineata Solved (Collembola)

By K. CHRISTIANSEN, Grinnell, Iowa

In 1939 Bueker described the species *Entomobrya duolineata* from the St. Louis area. This species has been unrecovered since that time and in my recent (1958) work on the genus *Entomobrya* I noted that this species could not be placed with any certainty. Recently Rev. John Ostdiek of Washington, D. C., sent me a number of specimens for identification. Among these were a number of specimens of *Entomobrya ligata* Folsom taken from the Patuxent Refuge, Laurel, Md. These included some very young specimens having a pattern almost identical with that figured by Bueker for *duolineata*. In view of this I am now synonymizing *duolineata* with *E. ligata* Folsom.

# The Salivary Gland Chromosomes of Anopheles punctipennis Compared with Those of the Anopheles maculipennis Complex Diptera: Culicidae

By Dr. Guido Frizzi, Istituto di Zoologia, Universita di Pavia, Pavia, Italy

and

Dr. James B. Kitzmiller, Department of Zoology, University of Illinois, Urbana, Illinois

The occurrence of five sibling species within the complex formerly known as *"Anopheles maculipennis"* is now widely recognized. The demonstration of these biologically different but morphologically similar species grew out of the problem of "anophelism without malaria" in certain parts of Europe. The ultimate recognition of the biological differences was accompanied by a series of ecological and geographical observations, plus a series of crossbreeding experiments. The solution of this problem, with the consequent benefit to world health, is a tribute to the dedicated group of men who resolved it. (For a review of the *Anopheles maculipennis* speciation problem see Kitzmiller, 1953.)

In the palearctic region the complex which was formerly called *"Anopheles maculipennis"* is now considered to consist of the following sibling species:

*Anopheles maculipennis*
*Anopheles labranchiae labranchiae*
*Anopheles labranchiae atroparvus*
*Anopheles messeae*
*Anopheles sacharovi*
*Anopheles melanoon melanoon*
*Anopheles melanoon subalpinus*

Recognition of these species is difficult. Morphological characteristics are variable and, even when usable, are valid in a statistical sense only. Certain characteristics in the eggs may be used with more success for some of the forms.

Frizzi (1952) has clarified the identification of the palearctic members of the *maculipennis* complex by demonstrating that differences in the banding pattern of the salivary gland chromosomes are consistent among the various species. One species, *atroparvus,* can be reared in the laboratory; its chromosomal banding pattern was selected as the "standard." Comparing the other species with this standard pattern, it has been found that there are several different chromosomal rearrangements:

1) With the standard chromosomal pattern; *labranchiae* and *atroparvus.*
2) With a rearrangement in the right arm of chromosome III; *maculipennis, subalpinus* and *melanoon.*
3) With a rearrangement in the left arm of chromosome III and a small inversion in the X chromosome; *sacharovi.*
4) With a rearrangement in the right arm of chromosome III and an extensive complex rearrangement in the X chromosome; *messeae.*

A striking feature of natural populations has been that all specimens collected thus far have revealed only homozygous rearrangements. All characteristic chromosomal rearrangements have been found in appropriate areas—the Po valley, Sardinia, Sicily, Corsica, the southern coast of France and the Valencia region of Spain—but only as homozygotes. Only recently has it been possible to produce in a laboratory colony of *atroparvus,* an individual heterozygous for an inversion. The heterozygous arrangement has never been observed in material taken from the field.

The genetic affinity as determined by crossbreeding experiments, using males of *atroparvus* and females of other species, follows the following order: *labranchiae; subalpinus* and *melanoon; maculipennis; sacharovi; messeae.* The affinity ranges from a partial sterility in the crosses with *labranchiae* to a total sterility between *atroparvus* and *messeae.* When such genetic affinity is compared with the chromosomal rearrangements one sees that the degree of affinity is directly correlated with the extent of such rearrangements. That is, the greater the chro-

mosomal diversity, the greater sterility among the species considered. The results obtained by cytogenetic research agree quite perfectly with those obtained by various taxonomists and malariologists. The pattern of the chromosomal structure suggests a common origin of these species, and suggests that in specific differentiation, the chromosomal rearrangements may have had quite an important role. The fact that in natural populations such chromosomal rearrangements are always found in a given species in the homozygous state, makes us think that such rearrangements in the chromosomes have not become stabilized merely accidentally but that they are the result of long selection in a population which formerly may have presented a high degree of chromosomal polymorphism. This polymorphism has probably been widely diffused in the heterozygous state and the various species have been differentiated by selection of the presumably advantageous homozygotes.

This knowledge of the cytogenetic structure of the palearctic species has permitted the comparison of these species with the nearctic group of species usually considered to belong to the *Anopheles maculipennis* complex; *Anopheles freeborni, occidentalis, quadrimaculatus, aztecus* and *earlei.* From the study of the chromosomal patterns of the salivaries, it is evident that *Anopheles freeborni* and *Anopheles aztecus* both have the same chromosomal pattern as the palearctic species, thus revealing the genetic affinity which unites them. *Anopheles quadrimaculatus* is notably different both in the karyotype and in the chromosomal structure of the salivary chromosomes. Several segments of the salivary chromosomes of *quadrimaculatus* show distinct homologies with the chromosomes of the other species of the palearctic and nearctic groups, and therefore a remote affinity is possible. A particularly evident homology exists in the ends of the chromosomes.

One obvious difference exists between the palearctic and the nearctic species. At least in laboratory strains, heterozygotes are much more frequent in the North American material. In *Anopheles freeborni* there are at least two paracentric inversions, both in chromosome III; the extensive inversion in the left arm is

similar to that found in *sacharovi* and the other smaller one in the right arm is close to the centromere. In *aztecus* there is an inversion in the left arm of chromosome III, roughly similar to one of those found in *freeborni*. In *quadrimaculatus* inversions are also present, but a precise study of their localization has not as yet been carried out. With the possible exception of *quadrimaculatus*, therefore, the nearctic species usually considered to belong to the *maculipennis* group also show this affinity cytogenetically. The higher frequency of the heterozygous inversions seems also to be characteristic of the nearctic strains. All observations, however, of North American forms have been made upon laboratory strains, and therefore nothing is known concerning the situation in natural populations.

Of particular interest, therefore, has been the study of a natural population from a larval site at Muncie Pond near Urbana, Illinois. Of more than one thousand larvae captured, 287 were classified. This sample was found to consist of 99 *Anopheles quadrimaculatus* and 188 *Anopheles punctipennis*. A few *Anopheles quadrimaculatus* were examined and there was noted a certain grade of heterozygosity which was not classified further because of the reasons given above. Among the *Anopheles punctipennis* examined, the salivary gland chromosomal structure of 71 individuals, both males and females, was analyzed. In this small population, there were found 27 individuals with a chromosomal banding pattern identical to the "standard" pattern found in *Anopheles labranchiae atroparvus* and 44 individuals showing diverse chromosomal rearrangements as follows:

Left arm of chromosome III: 5 homozygous inversions and 15 heterozygous inversions, all involving zones 45–47 of the "standard" map.

Right arm of chromosome III: 7 homozygous inversions and 12 heterozygous inversions, involving zones 30–35.

Right arm of chromosome II: 7 heterozygous inversions involving zone 7.

Left arm of chromosome II: 5 heterozygous inversions involving zone 23.

Most individuals showed only one of these inversions, but several contained two, and one individual contained three heterozygous inversions in III D, II D, and II S. The map areas involved above are stated only approximately at this time.

The inversions in the third chromosome were most numerous, and therefore we have been able to observe the type of inversion arrangement with more exactness. The rearrangement in the left arm of the third chromosome corresponds to that found in *Anopheles sacharovi* while in the right arm the arrangement corresponds to that found in *messeae*. Although *Anopheles punctipennis* has for several reasons been considered to be outside the *maculipennis* group, it clearly may be considered to belong to this group in terms of the structure of the chromosomes.

The inversions found in *punctipennis* are interesting for three principal reasons:

1) The rearrangements found in the third chromosome are very similar to those found in several species of the *maculipennis* group, both nearctic and palearctic.
2) The high frequency of homozygous third chromosome inversions in this sample, as compared with the rarity of their occurrence in the laboratory strain of *freeborni*.
3) The presence of inversions in chromosome II. No second chromosome inversion has ever been found in any species of the *Anopheles maculipennis* group.

These observations indicate that from a cytogenetic point of view, *Anopheles punctipennis* shows clear affinities with the *maculipennis* complex. For several reasons it has been considered to be distinct from this group, but the cytological evidence, at least, would argue for reexamination of its taxonomic position. On the other hand, *quadrimaculatus*, which has often been included with the nearctic *maculipennis* complex, is clearly more distant, cytogenetically, than *punctipennis*.

The frequency of the inversions found in *punctipennis* suggests a high incidence of chromosomal polymorphism. The specific inversions observed are remarkably similar to those found in *sacharovi* and *messeae*. Most surprising was the finding of second chromosome inversions, which have never been seen in the palearctic material.

To draw any definite conclusions from these observations is, of course, premature but it is certainly legitimate to ask some pertinent questions. Here is a case of a natural population in North America presenting a chromosomal polymorphism much higher than that which characterizes the group of species in the palearctic zone. What can be expected from the other species such as *freeborni, aztecus* and *earlei* which we know now only from laboratory strains? What is the significance of such an elevated polymorphism in the nearctic species in comparison with the palearctic species? Should we consider the palearctic species as derived from polymorphic populations whose polymorphism in this zone has been lost under heavy selection pressure, while the polymorphism has been maintained in the nearctic zone perhaps because of more diverse environmental conditions? On the other hand, is it possible to think that the chromosomal polymorphism of the nearctic species may be the original polymorphism and that the palearctic species may be derived from the nearctic populations? Is it possible that the inversion heterozygotes found in the species of *maculipennis* demonstrate the same kind of selective advantage as has been shown for *Drosophila?* If, in fact, such inversions have diverse selective advantage, the question would now assume not only a theoretical value but also a practical one. It is not known at the present time how a polymorphic population behaves with respect to various kinds of insecticides and, therefore, the recognition of such polymorphism may be indeed an advantage in the resolution of the problem of resistence to insecticides. Without question, the need for further investigation of the natural polymorphism of nearctic anophelines is clearly indicated.

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FRIZZI, G. 1952. Nuovi contributi e prospettive di ricerca nel gruppo *Anopheles maculipennis* in base allo studio del dimorfismo cromosomico (ordinamento ad X invertito e tipico nel messeae). Symposia Genetica, 3: 231-265.

KITZMILLER, J. B. 1953. Mosquito genetics and cytogenetics. Rev. Bras. Mal. doen. trop., 5: 285–359.

## The Relationships of Three New Species of Triaenodes from Illinois and Florida (Trichoptera)

By HERBERT H. ROSS, Illinois Natural History Survey, Urbana

The discovery of a puzzling new caddisfly belonging to the genus *Triaenodes* in a small southern Illinois spring drew attention to the possibility that members of this genus might contribute suggestions concerning faunal movements associated with Pleistocene events. Efforts to establish the relationships of the species led to the unraveling of the phylogeny of the entire branch of the genus to which it belongs, and to a better understanding of the evolution of certain characters in members of the branch. The new species proved to be not only local in distribution but a primitive member of its branch, hence it may well be both a phylogenetic and geographic relict.

The 20 nearctic species of *Triaenodes* comprise about six separate phyletic branches: (1) *frontalis* Banks and *grisea* Banks having lamellate male claspers and auriculate female cerci; (2) *helo* Milne, *ochracea* (Betten and Mosely), and *perna* Ross having simple triangular male claspers; (3) a cluster of three or four apparently closely related lines, characterized by the differentiation of mesal and lateral lobes on the male clasper but lacking sclerotized subanal invaginations in the terminal female structures, including *aba* Milne, *nox* Ross, *tridonta* Ross, *melaca* Ross, *phalacris* Ross, *ignita* (Walker), *taenia* Ross, and *florida* Ross; and (4) the *flavescens* and *injusta* complexes of nine species in which the male clasper is divided into mesal and lateral lobes and the female terminal structures have

a sclerotized, invaginated structure *a*, shown in figures 2, 4, 7, 8, and 9. The species treated in this paper belong to these latter two complexes.

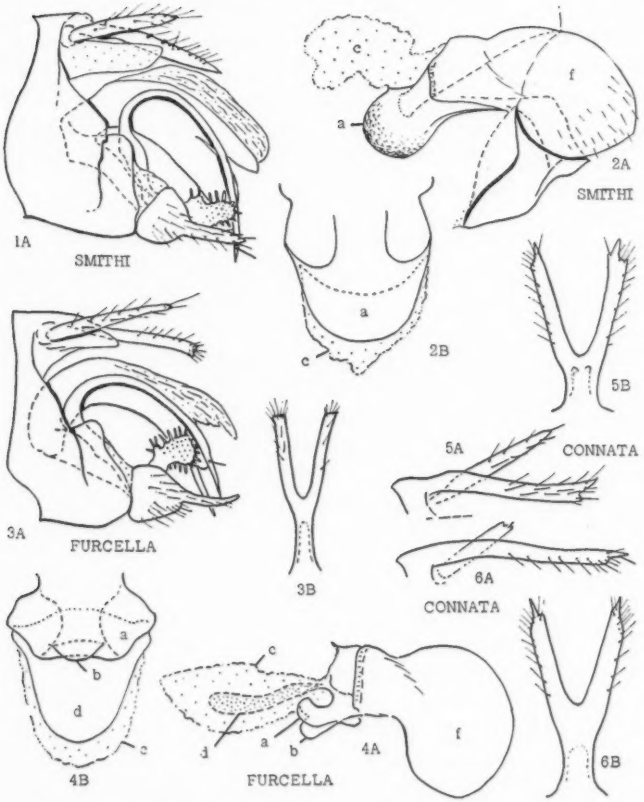
### The **flavescens** complex

The members of this complex have the tenth tergite single whereas those of the *injusta* complex have the tenth tergite forked, figs. 3*B*, 5*B*, 6*B*. The four previously described members of the *flavescens* complex for which females are known form two pairs, (1) *marginata* Sibley and *tarda* Milne in which the lateral process of the male clasper is unusually long (a specialized condition) and the female pouch *a* is small (presumably a primitive condition), and (2) *flavescens* Banks and *baris* Ross in which the lateral process of the male clasper is short (a primitive condition) and the female pouch *a* is larger and convoluted (a specialized condition). The new species *smithi* from southern Illinois combines in the one species both of these primitive conditions and would appear to represent a little-changed survivor of the species which was ancestral to the entire complex.

**Triaenodes smithi** new species

Length 12 mm. Color tawny with cream and brown striping on the front wing. Male genitalia as in fig. 1. Tenth tergite elongate, clavate, and with setae almost to apex. Clasper with lateral process longer than clasper base, finger-like; mesal process well set off from remainder of clasper and having peglike setae around its edge and on its mesal face; sclerotized process arising from base of clasper and recurved beside the aedeagus moderately long, those of the right and left sides almost identical. Aedeagus large and extending to tip of claspers. Terminal structures of female as in fig. 2. Ovipositor flaps (*f*) and the apical structures between them typical for the complex. Internal invaginations associated with the internal base of the ovipositor flaps consisting of a broad, rounded sclerotized pouch *a* and a dorsal irregular membranous structure *c*.

*Holotype* ♂ and *allotype* ♀.—Wolf Lake, Illinois, at McCann School Spring, June 6, 1951, at light, Ross and Richards. *Para-*




FIGS. 1-6. Terminal parts of *Triaenodes*. 1, 3, 5, 6, male genitalia; *A*, lateral aspect; *B*, dorsal aspect of tenth tergite. 2, 4, ovipositor flaps of female with associated internal invaginations; *a*, *b*, *c*, *d*, internal structures explained in text; *f*, external part of ovipositor flap.

*types*.—All from the same locality; same data as holotype, 10 ♂, 6 ♀; October 6, 1947, Ross and Smith, 1 ♂, 2 ♀; May 14, 1948, Smith and Stannard, 1 ♂, 1 ♀. These and other types described in this paper are in the collection of the Illinois Natural History Survey.

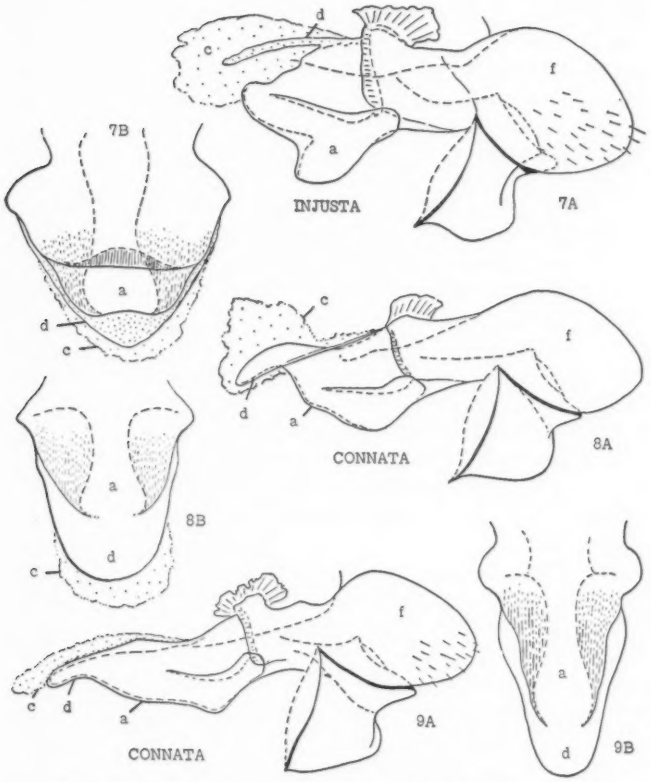
In existing keys the male of this species will run to *dipsia* Ross and will approach *flavescens*. From these two *smithi* may be distinguished by the evenly curved ventral margin of the aedeagus (notched in *dipsia*) and the clavate tenth tergite which is widest not far from the apex (sinuate and widest near base in *flavescens*). The female may be distinguished from related species by the shape of invaginated pouch *a*.

### The injusta complex

The ancestral form of this complex almost certainly arose from a species of the *flavescens* complex having a male much like that of *smithi* or *baris*, but in which the long mesal projection of the tenth tergite simply doubled. In all species of the *flavescens* complex the tenth tergite is angled slightly to right or to left, usually one way or the other throughout a particular species, but occasionally a right-handed specimen will occur in a normally left-handed species. Perhaps as a consequence of this type of variation a double-handed individual arose and set the stage for the forked condition now found throughout the *injusta* complex.

Formerly only one species, *injusta* (Hagen), was recognized in the complex but detailed study of many series demonstrates the presence of at least three. Probably the most primitive species is *furcella* n. sp. in which the female internal pouch *a* is unattached to flap *d*, fig. 4. The next evolutionary development occurs in *injusta*, fig. 7, in which flap *d* is joined to the upper edge of the base of pouch *a*, and the next is found in *connata* n. sp. in which pouch *a* and flap *d* have fused into a single, evenly sclerotized structure. A single female specimen from Arkansas may represent a still greater specialization of this structure but to solve this question more material is needed.

The ranges of these species are of great interest, *furcella* occurring only in Florida, *injusta* distributed from southern Quebec westward through Minnesota (occurring principally in marshes, lakes, and large rivers), and *connata* in the hilly country from Connecticut westward to at least Illinois. Thus it would appear that the progenitor of the *injusta* complex origi-




FIGS. 7–9. Ovipositor flaps and associated internal structures of *Triaenodes* females. *A*, lateral aspect, *B*, ventral aspect; *a*, *c*, *d*, internal structures explained in text; *f*, external part of ovipositor flap.

nally divided into a southeastern form now represented by *furcella* and a more northern species, and that the latter subsequently divided into a more northern species (*injusta*) and a more southern species (*connata*). If the Arkansas specimen does indicate the presence of another species, it is an offshoot of *connata*, and would imply a more recent division of that spe-

cies. The ranges of these forms have certainly been affected by Pleistocene events, and there is the definite possibility that more data about the ranges themselves would give us valuable hints concerning these past happenings.

**Triaenodes furcella** new species

Length 12 mm. Color tawny with cream and brown pattern on the front wings. Male genitalia as in fig. 3. Tenth tergite forked, fig. 3*B*, each arm slender and almost transverse at the apex. Clasper with lateral process slender, slightly longer than base; mesal lobe well set off from base and with the usual peglike setae; basal sclerotized processes recurved alongside the aedeagus, the two curved laterad almost equally at their tips. Aedeagus large and extending to the tips of the claspers. Ovipositor flaps of the female and associated internal structures as in fig. 4. Sclerotized pouch *a* short and wide, with an apical indentation and a ventral lip *b*. Above this arises a large semi-sclerotized U-shaped flap *d* surrounded dorsally and laterally with membranous folds *c*.

*Holotype* ♂, *allotype* ♀.—Georgetown, FLORIDA, April, 1948. *Paratypes.*—All from Florida; same as for holotype, 4 ♂, 11 ♀; Orlando, May 5, 1944, Frison and Ross, 1 ♀.

This species is readily separated from its closest relative *injusta* by the truncate arms of the tenth tergite (pointed in *injusta*) and the short sclerotized internal pouch *a* of the female (large and fused with the dorsal edge of *a* in *injusta*).

**Triaenodes connata** new species

Length 12 mm. Color tawny with a cream and brown pattern on the front wings. Male genitalia as previously illustrated for *injusta* (Ross 1944), much as in fig. 3*A* but with tenth tergite otherwise and lateral process of clasper at most half as long as in fig. 3*A*. Tenth tergite, figs. 5, 6, with lateral arms stout and produced at apex into a point; laterally there is sometimes an angular shoulder at the base of the point. Terminal

structures of female as in figs. 8, 9. Ovipositor flaps and associated external structures typical for this and the *flavescens* complex. Of the internal structures, pouch *a* is fused solidly with flap *d*, the two forming a uniformly sclerotized continuous structure. In the specimens seen considerable variation occurs in the exact shape of this compound structure, both laterally and ventrally; the extremes are illustrated by fig. 9, the holotype, and fig. 8, a paratype from Mt. Carmel, Connecticut.

*Holotype* ♀, *allotype* ♂.—Wilmington, ILLINOIS, along Kankakee River, July 1, 1935, DeLong and Ross. *Paratypes.*—Mt. Carmel, CONNECTICUT, July 27, 1938, K. M. Sommerman, 1 ♀, September 15, 1944, A. H. Sommerman, 4 ♂, 1 ♀; Livingston, KENTUCKY, June 16, 1935, H. H. Ross, 1 ♀; Pineville, Kentucky, June 24, 1938, T. H. Frison and T. H. Frison, Jr., 1 ♂, 2 ♀; Oakwood, Illinois, June 14, 1935, C. O. Mohr, 1 ♀; Wilmington, Illinois, same as for holotype, 1 ♀.

This species is closest to *injusta,* from which it can be distinguished by the fused confluent structure of the internal sclerotized pouch of the female, figs. 8, 9, in contrast to the deeper pouch found in *injusta,* fig. 7, and the semi-membranous condition of flap *d* which is fused only with the basal part of pouch *a*. To date characters have not been found to separate with certainty the males of these two species.

## LITERATURE CITED

Ross, H. H. 1944. The caddisflies or Trichoptera of Illinois. Ill. Nat. Hist. Surv. Bull., 23: 1–326.

# An Unusual Swarming of a Stinkbug near Wasilla, Alaska

By RICHARD H. WASHBURN, Alaska Experiment Station, Palmer, Alaska

A stinkbug, *Elasmostethus interstinctus* (L.), was swarming near the shores of several lakes in the Matanuska Valley in the vicinity of Wasilla, Alaska in June, 1958. During most of the day they rested on vegetation, mainly the quaking aspen, *Populus tremuloides*. The heaviest concentrations were on the catkins and bark.

From approximately 6 to 8 p.m. each evening they flew in a circular haphazard pattern, occasionally alighting on any convenient surface before taking off again. In an area near Wasilla Lake they were especially annoying by alighting on heads and shoulders, in considerable numbers, of patrons of a lodge as well as the laundry that was hung up to dry in the vicinity. They were present in large numbers from June 1 to June 20 and disappeared from the area after a heavy rain shower. Although mating was observed, no eggs were found nor were nymphal forms observed later in the summer in the area. No evidence of feeding injury was found. Fortunately this species is not characterized by the objectionable odor so common to many of this group. This species has been noted in the Palmer vicinity previously but only as an individual specimen.

The species was determined by R. I. Sailer of the Entomology Research Division, Agricultural Research Division, U.S.D.A.

# Undescribed Species of Crane-Flies from the Western United States and Canada (Dipt.: Tipulidae). Part XIX

By CHARLES P. ALEXANDER, Amherst, Massachusetts *

The preceding part under this general title was published in ENTOMOLOGICAL NEWS, 69: 215–221, 1958. Most of the species discussed herewith were taken in California in 1957 and 1958, the types of the novelties being preserved in the Alexander Collection of Crane-flies.

**Limonia (Dicranomyia) ypsilon** new species

Allied to *gracilis;* general coloration of mesonotal praescutum light brown with three darker brown stripes; wings subhyaline, stigma slightly darker; male hypopygium with the proctiger dark brown, Y-shaped, very conspicuous in slide mounts.

♂. Length about 6–6.5 mm.; wing 6.5–7 mm.

Rostrum yellow; palpi brownish black. Antennae black throughout; flagellar segments oval to long-oval, verticils relatively inconspicuous. Head grayish brown, the narrow orbits more yellowed, sparsely pruinose.

Pronotum dark brown. Mesonotal praescutum with the ground light brown, with three more or less distinct darker brown stripes, the lateral pair continued across the suture onto the scutal lobes; scutellum light brown, paler apically; mediotergite dark brown, sparsely pruinose, pleurotergite paler. Pleura obscure yellow to brownish yellow, variegated with darker, especially on the anepisternum and ventral sternopleurite. Halteres elongate, stem dusky, narrowly yellowed at base, knob dark brown. Legs with the coxae and trochanters testaceous yellow; remainder light brown to brown, the outer tarsal segments darker. Wings subhyaline, stigma only slightly darker, inconspicuous; veins pale brown. Venation: $Sc_1$ ending

* Contribution from the Entomological Laboratory, University of Massachusetts.

I am deeply indebted to the National Science Foundation for financial aid to cover travel expenses in Western North America in 1956, 1957 and 1958.

about opposite origin of *Rs*, $Sc_2$ far retracted, $Sc_1$ alone subequal to or longer than *Rs*; *m-cu* at or close to fork of *M*.

Abdominal tergites dark brown, the posterior borders narrowly obscure yellow, most evident on the intermediate segments; sternites paler brown, posterior borders yellowed; hypopygium obscure yellow to brownish yellow. Male hypopygium generally as in *gracilis*, including the large tergite, straight dorsal dististyle, and unequally bifid rostral prolongation. The most evident difference, which has suggested the specific name, is the dark brown Y-shaped proctiger, very conspicuous in slide mounts. In *gracilis*, the proctiger appears as two pale and inconspicuous divergent lobes or blades. The tergite differs in shape and structure in the two species, being more nearly oval, with heavily thickened margins, in *gracilis;* in *ypsilon* the cephalic border is strongly convex, the posterior margin nearly straight to subtruncate. Both species have the aedeagus conspicuously hairy.

*Habitat.* Pacific States. *Holotype:* ♂, Coldwater Creek, Mammoth Lakes District, Mono Co., CALIFORNIA, 9,000 feet, July 16, 1957 (C. P. Alexander). *Paratopotypes:* ♂♂. *Paratypes:* Numerous specimens from various localities, as follows: ♂ from the type series of *particeps* Doane, Keyport, Kitsap Co., WASHINGTON, July 1905 (R. W. Doane); Stevens Pass, Chelan Co., Washington, 4,000 feet, July 8, 1948 (C. P. Alexander); Peavine Ridge, Yamhill Co., OREGON, March 26, 1946, July 1, 1946 (K. M. Fender); Silver Creek Falls, Marion Co., Oregon, May 9, 1948 (K. M. Fender); State Line Brook, Del Norte Co., California, July 27, 1958 (C. P. Alexander); Prairie Creek State Park, Humboldt Co., California, July 23, 1958 (C. P. Alexander); Burney Falls State Park, Shasta Co., California, August 4, 1958 (C. P. Alexander); Lost Creek, north of Lassen Volcanic National Park, Shasta Co., California, 5,000 feet, August 10, 1958 (C. P. Alexander); Helfer's Ranch, Mendocino Co., California, July 19, 1958 (C. P. Alexander & Jacques Helfer); Russian Gulch State Park, Mendocino Co., July 20, 1958 (C. P. Alexander & Jacques Helfer); Cleone Lake, MacKerricher State Park, Mendocino Co., July 20, 1958 (C. P.

Alexander & Jacques Helfer); Lagunitas Creek, Samuel P. Taylor State Park, Marin Co., California, in redwood forest, July 16, 1958 (C. P. Alexander); Pinecrest, Tuolumne Co., California, July 29, 1947 (Paul H. Arnaud); Kings Canyon National Park at Swale Camp, Tulare Co., California, 6,400 feet, July 19, 1957 (C. P. Alexander); Sequoia National Park, Tulare Co., California, June 6–8, 1948 (Otto Degener), July 18, 1957 (C. P. Alexander); Chiricahua Mts., Cochise Co., ARIZONA, 6,000 feet, June 4, 1942 (C. P. Alexander). This also includes all published records for *particeps* Doane between 1920 and 1958 with the exception of the actual types from Keyport, Washington.

The present fly has been confused under the name *particeps* Doane (ENT. NEWS, 19: 7–8; 1908). In the type series of the latter, all from Keyport, Washington, collected in July 1905 by Doane and including nine males and six females, it is now evident that two species are confused. In an exchange of specimens with Doane I received a paratype male which naturally was considered as being conspecific with the holotype. However an examination of this latter specimen in San Francisco in July 1946 clearly showed that this was a different species from the paratype that I had received earlier. The actual type of *particeps* is identical with the species later described as *Limonia* (*Dicranomyia*) *uinta* Alexander (AMER. MIDL. NAT., 39: 38–40, figs. 13, 17; 1948) and true *particeps* is at present known only from Utah and Washington. I am greatly indebted to Drs. Edward S. Ross and Edward Kessel for preparing the genitalic mount of the holotype of *particeps* and in this manner finally clearing up a confusing situation in our study of the Western North American Tipulidae.

The nearest relatives of *ypsilon* are *L.* (*D.*) *particeps,* as discussed, and *L.* (*D.*) *gracilis* (Doane). The latter is a larger more yellowish fly, with the hypopygial structure distinct, as discussed above. It is widely distributed in the west and likewise occurs in the White Mountains, New Hampshire (Headwall of Tuckerman's Ravine, Mount Washington, 5,000 feet, in late August). Moreover, the northern European *L.* (*D.*) *hal-*

*terella* Edwards appears to be conspecific and would become the valid name for the fly in case the name *gracilis* is ever considered to be invalidated by prior use in *Limonia* (*Limnobia*), as by *Limnobia gracilis* Wiedemann (1828) and *Limnobia gracilis* Zetterstedt (1838).

**Limnophila (Phylidorea) brevifilosa** new species

General coloration of thorax brownish yellow, the praescutum darker medially, pleura reddish; femora yellow, the tips narrowly darkened; wings tinged with yellow, stigma dark brown, oval; male hypopygium with the three branches of the aedeagus elongate but distinctly shorter and stouter than in all related regional species; gonapophysis appearing as an exceedingly narrow blade that is extended into an acute spine.

♂. Length about 9.5 mm.; wing 8.5 mm.; antenna about 1.6 mm.

♀. Length about 10–12 mm.; wing 10–12 mm.

Rostrum plumbeous; palpi black. Antennae with scape black, pedicel and flagellum light brown; flagellar segments passing through oval to elongate. Head light gray.

Pronotum brown, paler laterally. Mesonotal praescutum dark brown medially, the sides broadly brownish yellow; scutal lobes darkened, especially on the mesal parts; scutellum and mediotergite obscure yellow, narrowly darkened medially; pleurotergite reddish yellow. Pleura reddened, vaguely pruinose; meron and metapleura yellowed. Halteres with stem pale yellow, knob infuscated. Legs with coxae reddish yellow; trochanters yellow; femora yellow with a narrow vaguely indicated darkening at or close to the tip; tibiae brownish yellow, narrowly darkened at tip; tarsi obscure yellow, terminal segments darker. Wings tinged with yellow, the prearcular and costal fields clearer yellow; stigma oval, dark brown; very narrow pale brown seams over the cord, fork of $M_{1+2}$ and along vein *Cu*, the latter chiefly in cell $M$; veins pale brown, slightly brightened in the yellowed fields. Venation: *Rs* relatively short, a little longer than cell *1st* $M_2$, weakly angulated near origin; cell $M_1$

longer than its petiole; *m-cu* at or close to midlength of $M_{3+4}$.

Abdomen obscure brownish yellow, in the male the subterminal segments blackened to form a broad ring, hypopygium yellow; in the female, subterminal ring narrower, genital shield fulvous. Male hypopygium with the median tergal lobes oval, separated from one another by pale membrane. Terminal point of outer dististyle slender; outer half of inner style strongly narrowed, subcylindrical. Aedeagus a little longer and stouter than the lateral branches, all three elements distinctly shorter and relatively stouter than in other regional members of the adusta group. Gonapophysis appearing as an exceedingly narrow blade that is extended into an acute spine.

*Habitat.* CALIFORNIA. *Holotype:* ♂, Intake Camp, Bishop Creek, Inyo Co., 8,000 feet, July 8, 1957 (C. P. Alexander). *Allotopotype:* ♀, pinned with type. *Paratopotype:* 1 ♀, pinned with type. *Paratypes:* 4 ♀♀, Big Pine Creek, Inyo Co., 9,000 feet, July 11, 1957 (C. P. Alexander).

There are four regional species of the *adusta* group that have the male hypopygium much as in the present fly. Of these, *Limnophila* (*Phylidorea*) *æquiatra* Alexander and *L.* (*P.*) *olympica* Alexander are black species while *L.* (*P.*) *pacalis* Alexander and *L.* (*P.*) *snoqualmiensis* Alexander are colored more as in the present fly but with the details of structure of the hypopygium distinct. The most similar species is *snoqualmiensis.* The relatively short stout branches of the aedeagus provide the strongest hypopygial characters in the present fly.

**Molophilus (Molophilus) gracilipes** new species

Belongs to the *gracilis* group, *pubipennis* subgroup; allied to *kulshanicus;* size large (wing of male almost 6 mm.); general coloration of thorax reddish brown; legs extensively brownish black; wings weakly tinged with brown, without a darkened seam along vein *Cu;* vein $R_{2+3}$ oblique at origin; male hypopygium with the dorsal lobe of the basistyle slender and pointed; dististyles slightly narrower than in *kulshanicus.*

♂. Length about 5 mm.; wing 5.9 mm.; antenna about 1.5 mm.

Rostrum and palpi black. Antennae black; basal flagellar segments elongate-oval, with long verticils and a dense white pubescence; outer segments smaller with shorter verticils. Head dark brownish gray.

Pronotum clear light yellow, dark brown on sides; pretergites narrowly obscure yellow. Mesonotum almost uniform medium brown or reddish brown, without distinct pattern. Pleura concolorous, dorsopleural membrane slightly more yellowed. Halteres yellow. Legs with the coxae and trochanters obscure brownish yellow; femora brownish black, bases obscure yellow; tibiae and tarsi dark brown; legs long and slender, especially the fore and hind pairs; posterior tibia a trifle shorter than the femur, slender. Wings weakly tinged with brown, prearcular and costal fields more yellowed; no darkened seam along vein *Cu* as in *kulshanicus;* veins very pale brown, macrotrichia darker. Venation: $R_2$ lying distal to *r-m;* $R_{2+3}$ more oblique at origin than in *kulshanicus;* petiole of cell $M_3$ about twice *m-cu;* vein *2nd A* ending shortly beyond the level of origin of petiole of cell $M_3$.

Abdomen, including hypopygium, dark brown. Male hypopygium, as compared with *kulshanicus,* with the dorsal lobe of the basistyle slender and more pointed; spicules of ventral lobe less numerous but similarly crowded. Both dististyles slightly narrower; phallosomic plate less obtuse at apex.

*Habitat.* CALIFORNIA. *Holotype:* ♂, West side of Sonora Pass, along Middle Fork of the Stanislaus River, Tuolumne Co., 8,600 feet, June 27, 1957 (C. P. Alexander).

The most similar regional species is the more northern *Molophilus* (*Molophilus*) *kulshanicus* Alexander, which differs in the dark body coloration, details of pattern of the legs and wings, and in slight differences in structure of the male hypopygium.

**Molophilus (Molophilus) unispiculatus new species**

Belongs to the *gracilis* group, *pubipennis* subgroup; size medium (wing of male 4.5 mm.); mesonotum grayish brown, lateral borders and pleura yellow; knobs of halteres dark brown; legs chiefly brownish black; wings whitish, veins and macrotrichia darkened; $R_2$ in virtual transverse alignment with *r-m;* male hypopygium with the spicules of ventral lobe of basistyle extended into hairlike points; outer dististyle long and straight, its distal third curved to an acute point, spicules very reduced, restricted to the outer third; inner style smaller, strongly curved to the subacute point, surface with spicules, the more basal ones small.

♂. Length about 4 mm.; wing 4.5 mm.; antenna about 1.1 mm.

Rostrum dark brown; palpi brownish black. Antennae with scape and pedicel testaceous, flagellum black; flagellar segments suboval, with elongate verticils. Head brownish gray.

Pronotum and pretergites yellow. Mesonotal praescutum grayish brown, humeral and lateral borders yellow; posterior sclerites of notum chiefly infuscated. Pleura and pleurotergite yellow, ventral sternopleurite vaguely more darkened. Halteres with stem whitened, knob dark brown. Legs with coxae and trochanters yellow; femora brownish black, the color produced chiefly by dark vestiture, only the bases restrictedly paler; tibiae brownish black; tarsi black. Wings whitish, prearcular field restrictedly more yellowed; veins brown, macrotrichia still darker. Venation: $R_2$ virtually in transverse alignment with *r-m;* petiole of cell $M_3$ about two and one-half times *m-cu;* vein *2nd A* ending about opposite *m-cu.*

Abdomen dark brown, hypopygium yellowed. Male hypopygium with the dorsal lobe of the basistyle relatively slender, its apex obtuse; ventral lobe with about 16 to 18 spicules that are extended into hairlike points and a marginal series of elongate setae. Outer dististyle long and straight for about two-thirds the length, thence curved into a long acute spine, on outer margin before tip with a single projecting spicule, with smaller ones back from the tip, all restricted to the outer third, surface

of outer half with scattered weak setae; inner style smaller, strongly curved to the subacute tip, with spicules over virtually the whole surface, the basal ones very small. Phallosomic plate obtuse at tip.

*Habitat.* CALIFORNIA. *Holotype:* ♂, Coldwater Creek, Mammoth Lakes District, Mono Co., 9,000 feet, July 28, 1957 (C. P. Alexander).

The present fly is most similar to species such as *Molophilus* (*Molophilus*) *rainierensis* Alexander, differing especially in the coloration of the body and wings and in the structure of the male hypopygium.

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## Insects captured in black-painted and unpainted light traps [1]

By S. W. FROST, The Pennsylvania State University

During the summer of 1957, two identically-constructed Pennsylvania insect traps were operated adjacent to each other. One was a standard bright aluminum trap, the other was painted entirely dull black. The traps were hung six feet from the ground and so arranged that the lamps of the two traps were 3 feet apart. The positions of the traps were reversed every three days.

Many of the records have been combined to condense the table. The midges include Chironomidae, Cecidomyiidae, Mycetophylidae and Psychodidae. Miscellaneous Coleoptera include Phyllophaga, Aphodius, elm leaf beetles and several groups which were taken in small numbers.

An analysis of the catches is given in tables 1 and 2. The results indicate that the unpainted trap was approximately twice as effective as the black-painted trap. The moths, especially Pyralidae, Crambidae, Arctiidae and Geometridae, seemed less

[1] Authorized for publication on August 1, 1958, as paper No. 2282 in the journal series of the Pennsylvania Agricultural Experiment Station.

affected. Catches of four common species of economic importance are given in table 2.

TABLE 1. Insects Captured in Black-painted and Unpainted Light Traps State College, Pa., June 30-July 20

| Insects | Unpainted | Painted black | Insects | Unpainted | Painted black |
|---|---|---|---|---|---|
| Culicidae | 23 | 33 | Elateridae | 63 | 53 |
| Rhyphidae | 65 | 28 | Misc. Coleoptera | 3002 | 1529 |
| Tipulidae | 78 | 51 | Pyralidae | 64 | 61 |
| Simuliidae | 4 | 1 | Crambidae | 405 | 338 |
| Midges | 6569 | 3416 | Geometridae | 68 | 70 |
| Anthomyiidae | 205 | 75 | Noctuidae | 1221 | 874 |
| Drosophilidae | 239 | 107 | Tortricidae | 411 | 267 |
| Lonchopteridae | 75 | 21 | Arctiidae | 886 | 831 |
| Boboridae | 212 | 70 | Other Macros. | 132 | 115 |
| Misc. Diptera | 689 | 199 | Microlepidoptera | 1429 | 1020 |
| Aphididae | 104 | 50 | Macrotrichoptera | 1915 | 973 |
| Cicadellidae | 30257 | 14513 | Microtrichoptera | 843 | 344 |
| Miridae | 1000 | 598 | Formicidae | 71 | 55 |
| Misc. Homop. Hemiptera | 244 | 106 | Hymenoptera | 989 | 700 |
| Carabidae | 514 | 422 | Misc. insects | 221 | 118 |
| Staphylinidae | 1167 | 442 | Totals | 53325 | 27574 |
| Scarabaeidae | 112 | 55 | | | |
| Curculionidae | 48 | 39 | Per cent | 65.9 | 34.1 |

TABLE 2. Catches of Some Moths*

| Insect | Unpainted | Painted black |
|---|---|---|
| *Carpocapsa pomonella* (L) | 61 | 31 |
| *Agrotis ypsilon* (Rott.) | 96 | 85 |
| *Amathes c-nigrum* (L) | 27 | 17 |
| *Pseudaletia unipuncta* (Haw.) | 726 | 457 |

* These species are included under Noctuidae and Tortricidae in table 1.

# EXCHANGES

**This column is intended only for wants and exchanges, not for advertisements of goods for sale or services rendered. Notices not exceeding three lines free to subscribers.**

These notices are continued as long as our limited space will allow; the new ones are added at the end of the column, and, only when necessary those at the top (being longest in) are discontinued.

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**Conopidae** of the World wanted. Will pay 10¢ to $1.00 for pinned and labelled specimens. S. Camras, 4407 N. Milwaukee Ave., Chicago 30, Illinois.

**Anisoptera**—Nearctic sp. wanted for exchange, espec. Ophiog., Arigom., Aeschna, Neurocor., Somatoc., Cordulia, Dorocor., Leucor. R. D. Cuyler, Dept. of Entomology, N. C. State College, Raleigh, N. C.

**Bembicini and Stizini** (Hym., Sphec.) of New World wanted for revis. study. Will return upon request or at end of project. James E. Gillaspy, Dept. of Zoology, Univ. Texas, Austin 12, Texas.

**Agapema galbina.** Will exchange cocoons of this moth for nature books. E. Frizzell, Route 4, Box 96, San Benito, Texas.

**Tenebrionidae** of the World wanted, in exchange for insects of Argentina and neighboring countries. Horacio J. Molinari, Av. Lib. Gral San Martin 55, Acassuso (Buenos Aires), Rep. Argentina.

**Butterflies.** Wish to exchange specimens for Japanese species. Please write to Ichiro Nakamura (Boy, age 16), 26 Aza-Nichiyama Obayashi Takarazuka-shi, Hyogo-Ken, Japan.

**Phasmidae** of nearctic area desired alive. Purchase or trade, drawing on large stock of major orders, worldwide. Domminck J. Pirone, Dept. Entomology, Cornell University, Ithaca, N. Y.

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## A TAXONOMIC STUDY OF THE NORTH AMERICAN LICININI WITH NOTES ON THE OLD WORLD SPECIES OF THE GENUS DIPLOCHEILA BRULLE (COLEOPTERA)

By George E. Ball

258 pages of text, 75 tables, 3 diagrams,
15 plates, table of contents and index

This monograph considers the geographical variation, relationships, evolution and taxonomy of the carabid tribe Licinini. A general treatment, explaining the taxonomic approach used, definition of terms, criteria for delimiting species and subspecies, etc., precedes the systematic position. The genera *Diplocheila* (subgenera *Diplocheila, Neorembus, Isorembus*), *Dicaelus* (subgenera *Paradicaelus, Dicaelus, Liodicaelus*) and *Badister* (subgenera *Badister, Trimorphus, Baudia*) are each treated in some detail. Keys to the genera and species are given throughout as well as a description (or diagnostic notes), variation, distribution and frequently locality records for each of the forms treated. The phylogeny and zoogeography of each genus are discussed in a separate section. Variation of mensurable characters is treated in the 75 tables. Fifteen plates depict structural (including genitalia) and variational features of the species discussed.

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